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2 UNITED STATES DEPARTMENT OF AGRICULTURE
Bureau of Agricultural Economics
in cooperation with
UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

3 CLASS AND SIZE OF FARM, TENURE, AND INCOME, 1945.
Belle Fourche Irrigation Project, South Dakota
and the Lower Yellowstone Irrigation Project,
Montana and North Dakota



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5c

SUMMARY

- (1) Farms, including land both on and off the projects, averaged 740 acres on the Belle Fourche and 344 acres on the Lower Yellowstone.
- (2) One-third of the farmers on each project operated land off the project.
- (3) Sixty-four percent of the farmers on the Belle Fourche operated land off the project or pastured out livestock compared with 58 percent on the Lower Yellowstone.
- (4) About 20 percent of the farmers on the Belle Fourche operated over 160 acres against which water charges were levied, compared with 13 percent on the Lower Yellowstone.
- (5) About 10 percent of the farmers on the Belle Fourche irrigated over 160 acres compared with 15 percent on the Lower Yellowstone.
- (6) Less than half the project land on the Belle Fourche was owner-operated compared with nearly three-fourths on the Lower Yellowstone.
- (7) Gross cash income per farm in 1945 averaged nearly \$4,000 higher on the Lower Yellowstone than on the Belle Fourche.
- (8) Net income per farm in 1945 averaged \$1,300 higher on the Lower Yellowstone than on the Belle Fourche.
- (9) Livestock were the source of two-thirds of the gross cash income on the Belle Fourche compared with less than half on the Lower Yellowstone.
- (10) The net worth of farmers and the average annual gain in net worth averaged nearly twice as high on the Lower Yellowstone as on the Belle Fourche.
- (11) A higher correlation of net income and acreage in farm was found on the Belle Fourche than on the Lower Yellowstone.
- (12) There is a correlation of net farm income and gross income from beets on the Lower Yellowstone, but practically none on the Belle Fourche.
- (13) Of the variance in net income on the Belle Fourche, nearly one-third is accounted for by acreage in the farm when acreage irrigated, livestock pastured out, and gross income from beets are held constant. In contrast, none of the variance in net income can be accounted for in this way on the Lower Yellowstone.
- (14) Of the variance in net income on the Lower Yellowstone, considerably over one-third is accounted for by gross income from beets when acres in farm, acres irrigated, and livestock pastured out are held constant. In contrast, none of the variance in net income can be accounted for in this way on the Belle Fourche.

CLASS AND SIZE OF FARM, TENURE AND INCOME, 1945

Belle Fourche Irrigation Project, South Dakota and
The Lower Yellowstone Irrigation Project, Montana and North Dakota 1/

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INTRODUCTION

This report presents for the Belle Fourche and Lower Yellowstone Irrigation Projects data as to farm income of irrigators according to class of farm, tenure of operator, size of farm, and integration of irrigated with nonirrigated land. The Belle Fourche project is located in western South Dakota, and the Lower Yellowstone project, in western North Dakota and eastern Montana. These two projects differ considerably in production. Average value per acre of crops produced was found to be as follows:

Belle Fourche	\$17.00	<u>2/</u>
Lower Yellowstone	\$30.00	<u>3/</u>

Average per acre yield of crops also differed (table 2).

Data presented in this report are from a sample of 73 farms from the Belle Fourche and 92 farms from the Lower Yellowstone. (See page 12

1/ The study upon which this report is based was prepared under a memorandum of understanding between the Bureau of Agricultural Economics, U. S. Department of Agriculture and the Bureau of Reclamation, U. S. Department of the Interior. The data were collected and summarized by Earl F. Hodges, Lawrence A. Rouss, W. J. Fluke, and Harry A. Schmitt of the Bureau of Agricultural Economics. J. P. Wagner of the Bureau of Reclamation assisted with schedule taking. This report was prepared by John Muehlbeier of the Bureau of Agricultural Economics.

2/ Green, William A., Acreage, Production and Value of Crops, by Classes of Land, Belle Fourche Irrigation Project, 1924-43, Bur. Agri. Econ., Lincoln, Nebr., June 1946.

3/ Green, William A., Acreage, Production and Value of Crops, by Classes of Land, Lower Yellowstone Irrigation Project, 1928-43, Bur. Agri. Econ., Lincoln, Nebr., April 1946.

for details on selection and representativeness of sample.) Data except those for net worth, are for the year 1945. Net worth was as of March 1946, when the farmers were interviewed. It is recognized that in 1945 prices were high; nevertheless, the data should have value for comparing one group of farms with another.

The term "class of farm" as used in this report is based solely on the classification of the irrigable land in the farm as determined by the Bureau of Reclamation. Many farms contain other than irrigable land. For example, a farm may contain 100 acres of irrigable land, most of which is class 1, plus 1,000 acres of range off the project but, under this method, the farm would be class 1. "Class of farm" is the same as "predominant class of irrigable land." The method is used primarily to show how other land is combined with certain classes of irrigable land, and how this in turn affects farm income.

"Gross farm income" includes income from the sale of livestock, livestock products, and crops, plus off-farm employment.

"Net farm income" is gross farm income less expenses of production adjusted for changes in livestock and grain inventories. No adjustment is made in net farm income for depreciation on buildings and machinery.

Description of Projects

The Belle Fourche project is about 30 miles long and up to 15 miles wide. The land is level to rolling. Soils on level areas near the Belle Fourche River are sandy loams and the rolling uplands are clay. The irrigable acreage increased from 12,000 acres in 1908, when water first became available, to 83,000 acres in 1917. 4/ 5/ Since then, the irrigable acreage has been reduced to 72,000 acres. Of 44,000 acres net area in cultivation, about one-third is used for cereal grain, one-half for hay and forage, and one-tenth for sugar beets. 6/ Although area of land irrigated increased from 4,000 acres in 1908 to a high of 60,000 acres in 1920, acreage irrigated has fluctuated widely. In 1944 only 29,000 acres or 39.4 percent of the irrigable acreage was irrigated.

The annual gross value of crops produced on the Belle Fourche project has averaged around \$1 million for the last few years. Of this amount, about one-third was the value of sugar beets; one-third, hay and forage; and one-fourth, cereal grains. Fattening of lambs and cattle is an important enterprise. The area surrounding the Belle Fourche project is used mainly as range for livestock. Only limited farming is carried on.

4/ Irrigable acreage is that acreage for which the Bureau of Reclamation was prepared to supply water.

5/ Hodges, Earl F., Schmitt, Harry A., and Reuss, Lawrence A., Trends in Land Use and Crop Production, Belle Fourche Irrigation Project, South Dakota, 1908-44, Bur. Agr. Econ. and U. S. Dept. of Int., 1946.

6/ Net area in cultivation is all irrigable land from which crops were harvested, land in soil-improvement crops, fallow or fall-plowed land, and land irrigated for pasture.

The Lower Yellowstone project is about 80 miles long and varies in width from about one-fourth mile to 5 miles. The land is level to gently rolling. Irrigable acreage increased from 38,000 acres in 1912 to 58,000 acres in 1924, but this was reduced to 57,000 acres in 1938 and has since remained unchanged. 7/ Of 47,000 acres net area in cultivation, approximately one-third was in cereal grain, one-third in hay and forage, and one-third in sugar beets.

The annual gross value of crops produced on the Lower Yellowstone project has averaged nearly \$3 million the last few years. Of this amount, about one-third was the value of sugar beets, one-third hay and forage, and one-fourth cereal grain. Fattening of cattle and lambs is an important enterprise here also. The more level land surrounding the project is used for production of cereal grains, principally wheat. The more rolling land is used as range for livestock.

DESCRIPTION OF FARMS AND LAND USE

Belle Fourche

Farms on the Belle Fourche, including land on and off the project, averaged 740 acres (table 3). The smallest was 30 acres, and the largest, 10,004 acres. Those farms which contain only project land ranged from 30 to 2,060 acres, while those with land off the project ranged from 240 to 10,004 acres. Some of the farms, although they were wholly on the project, were large because they contained a large acreage of nonirrigable land, which was mainly for pasture. About one-third of the farms were under 201 acres and over two-thirds were under 401 acres (table 4).

The average sized farm of 740 acres contained 278 acres of project land and 462 acres of outside land. In other words, nearly two-thirds of the acreage was outside the project. Nearly one-third of the farmers operated some land off the project. Of 278 acres of project land in the average farm, 88 acres were irrigated, 41 acres were dry-farmed, and 149 acres were in pasture (table 5). The 462 acres of outside land were used almost entirely for range and pasture.

Project land in the farms was about equally divided between paying and nonpaying land. 8/ About 20 percent of the farmers operated in excess of 160 acres of paying land and about half operated from 80 to 160 acres (table 6). A few large farms contained very little paying land, but several had over 200 acres and one had over 700 acres. Whether land upon which water charges are assessed is irrigated is important insofar as the cost of water per acre irrigated is concerned. About 10 percent of the farmers irrigated over 160 acres in 1945 and one irrigated over 400 acres (table 7).

7/ Hodges, Earl F., Reuss, Lawrence A., and Schmitt, Harry A., Trends in Land Use and Crop Production, Lower Yellowstone Irrigation Project, Montana and North Dakota, Bur. Agr. Econ., 1946.

8/ Nonpaying land is class 5 and 6 land. It is temporarily suspended from the acreage against which water charges are levied, or non-irrigable land. Some of the land is used for pasture.

About 85 percent of the farmers irrigated less than 121 acres. On the other hand, nearly half operated in excess of 120 acres of paying land. Many did not irrigate all the acreage against which water charges were assessed.

9/

The acreage in a farm is only one indicator of size. The number of livestock "pastured out", the number fed, or the kinds of crops produced also bear on size. 10/ About half of the farmers pastured out livestock. Of those who did so, half also operated land outside the project. The 73 farmers, whose farms averaged 740 acres, pastured out livestock equal to an average of 25 animal units per farm. The largest of these pastured out 190 animal units.

Class 1 farms were the smallest and averaged 174 acres (table 8). These farms contained only project land, but the farmers pastured out nearly as many livestock as the average for the project. Class 2 and 3 farms averaged 946 acres and 674 acres respectively. These farms contained much outside land. Class 4 farms averaged 524 acres, of which only 48 acres were off the project, and fewer livestock were pastured out than on class 1, 2, and 3 farms.

Lower Yellowstone

Farms on the Lower Yellowstone averaged 344 acres and ranged in size from 22 to 2,990 acres. The largest farm wholly on the project contained 546 acres. Farms which contained outside land ranged from 98 acres to 2,990 acres. Over half the farms were under 201 acres and three-fourths were under 401 acres.

The average sized farms were nearly equally divided between project and outside land. A smaller acreage and a small proportion of the average farm was off-project land on the Lower Yellowstone than on the Belle Fourche. Similar to the Belle Fourche, about one-third of the farmers operated outside land on the Lower Yellowstone. Of the 157 acres of project land in the average farm, 107 acres were irrigated, 4 acres were dry-farmed and 46 acres were in pasture. 11/ In contrast to the Belle Fourche, very little project land was dry-farmed on the Lower Yellowstone. Of the 187 acres of off-project land, 46 acres were dry-farmed and the remainder was used for range and pasture.

Of the 157 acres project land, two-thirds were in the paying class and one-third were nonpaying. Thirteen percent of the farmers operated in excess of 160 acres of paying land and half operated from 80 to 160 acres.

Fifteen percent of the farmers irrigated in excess of 160 acres in

9/ Belle Fourche.

Correlation of total acres in farm and paying acreage	-r=+ .36
Correlation of total acres in farm and irrigated acreage	-r=+ .38
Correlation of paying acreage and irrigated acreage	-r=+ .65
Correlation of total acres in farm and livestock pastured out	-r= +.25

10/ Some farmers pastured out livestock by paying for the pasture per animal-unit month.

11/ Lower Yellowstone.

Correlation of total acres in farm and paying acreage	-r= +.40
Correlation of total acres in farm and irrigated acreage	-r= +.43
Correlation of paying acreage and irrigated acreage	-r= +.94
Correlation of total acres in farm and livestock pastured out	-r= +.30

1945 and slightly less than half irrigated from 80 to 160 acres. Farmers on the Lower Yellowstone irrigated practically the entire acreage on which they were assessed water charges.

Farmers on the Lower Yellowstone pastured out livestock at the average rate of eight animal-units per farm. All of the farmers who pastured out livestock also operated land off the project. Class 1 and 2 farms were the same size, but class 4 farms were slightly larger because they contained a larger acreage of outside land. Class 3 farms were the largest and the operators pastured out more than twice as many livestock as did the others.

LAND OWNERSHIP AND TENURE OF OPERATOR

Belle Fourche

A little more than one-third of the land in the Belle Fourche farms was owner-operated and the rest was operated under lease (table 9). Nearly half of the project land was owner-operated in contrast to only one-third of the land off the project. Less than one-fifth of the land in class 4 farms was owner-operated.

Not quite one-third of the 73 operators were full-owners, one-third part-owners, and over one-third tenants (table 10). Farms of full-owners averaged 306 acres; part-owners, 1,725 acres; and tenants, 270 acres. Full-owners operated 220 acres of project land, part-owners 388 acres, and tenants 232 acres. Full-owners and tenants operated only a small acreage of outside land and they pastured out fewer livestock than did the part-owners.

Full-owners and part-owners averaged about the same age, a little over 50 years. Tenants averaged a little over 40 years of age. Tenants had occupied their present farms an average of 6 years. This was only one-third as long as the occupancy of full- and part-owners. Also tenants had been on the project only about two-thirds as long as full- and part-owners.

Lower Yellowstone

Farmers on the Lower Yellowstone owned two-thirds of the land they operated. Three-fourths of the project land and nearly two-thirds of the outside land was owner-operated. Fifty percent of the operators were full-owners, 32 percent were part-owners, and 18 percent were tenants. The farms of part-owners were larger than were those of the other two tenure groups primarily because more land belonging to these farms was outside the project. Only part-owners pastured out significant numbers of livestock. A higher percentage of the land was owner-operated and a higher percentage of the operators owned some land on the Lower Yellowstone than on the Belle Fourche.

Full-owners averaged 50 years of age, part-owners 42, and tenants 37. Full- and part-owners had been on their present farms more than twice as long as tenants. Tenants averaged only 7 years on their present farms.

FARM INCOME

Belle Fourche

A wide range in gross farm income was found on the Belle Fourche; gross farm income averaged \$5,576 per farm in 1945 and net income, \$2,806 (table 11).

Over 10 percent of the farms showed a net loss for the year. The largest loss was nearly \$4,000. Net farm income for about one-fifth of the farms was over \$5,000 and the largest was over \$17,000.

Net farm income increased from an average of \$1,743 for farms under 201 acres to \$9,487 for farms 1,601-4,000 acres, then decreased for the few farms over 4,000 acres. 12/ The net farm income of farms under 601 acres, which includes 80 percent of the total, averaged slightly under \$2,000. The acreage of paying land averaged larger in the larger farms as did the acreage of off-project land and livestock pastured out.

Net farm income averaged greatest for class 2 farms and second greatest on class 3 farms (table 12). These farms were larger and contained a larger paying acreage.

The importance of total size shows when farms are grouped according to paying acreage per farm (table 13). Farms with less than 41 acres of paying land and those with over 160 acres showed the largest net income; these two groups contained the largest acreage of outside land and the operators of these farms also pastured out more livestock. 13/

The net farm income of part owners averaged \$4,364 compared with \$2,395 for full-owners and \$1,849 for tenants (table 14). Farms of part-owners averaged more than five times larger than those of full-owners and tenants. Tenants had been on their farms only about one-third as long as part- and full-owners.

Livestock accounted for nearly two-thirds of the gross cash income of the farmers in 1945, and crops, one-third. Livestock as the source of gross cash income ranged from 48 percent on class 1 farms to 80 percent on class 4 farms. Full-owners received 63 percent of their gross cash incomes from livestock; part-owners, 76 percent; and tenants, 50 percent.

12/ Belle Fourche.

Correlation of net farm income and total acres in farm	-r=	+.46
Correlation of net farm income and paying acreage	-r=	+.20
Correlation of net farm income and irrigated acreage	-r=	+.39
Correlation of net farm income and livestock pastured out	-r=	+.23
Correlation of net farm income and gross income from beets	-r=	+.04
Correlation of irrigated acreage and gross income from beets	-r=	+.24

13/ Variance in net farm income is accounted for as follows:

	B. F.	L.Y.
	Pct.	Pct.

(1) By correlation with acres in farm when acres irrigated, livestock pastured out, and gross from beets, are held constant.	32	- 1.9
(2) By correlation with acres irrigated, when acres in farm, livestock pastured out, and gross from beets, are held constant.	27	15
(3) By correlation with livestock pastured out, when acres in farm, acres irrigated, and gross from beets are held constant.	16	16
(4) By correlation with gross from beets, when acres in farm, acres irrigated, and livestock pastured out are held constant.	-	.4 40

Lower Yellowstone

Gross farm income on the Lower Yellowstone averaged \$9,508 per farm in 1945 and net farm income averaged \$4,164 (table 15). This was considerably larger than on the Belle Fourche. About 10 percent of the farms showed a loss, as on the Belle Fourche. The largest loss was over \$2,500. About one-third of the farms showed a net farm income of over \$5,000, a higher percentage than on the Belle Fourche. About 10 percent of the farms showed a net farm income of over \$10,000; the highest was over \$25,000.

Net farm income for farms under 100 acres averaged \$1,814, slightly more than for farms under 201 on the Belle Fourche. 14/ Net farm income on the Lower Yellowstone increased as size of farm increased, with an income of \$8,829 for the group containing 300-399 acres. For farms of over 400 acres net farm income averaged about \$5,000.

Net farm income on class 1 farms averaged \$5,902 compared with \$4,388 on class 2, \$3,144 on class 3, and \$378 on class 4 (table 16). Although class 1 farms were the smallest, the paying acreage was larger than for other groups. Class 3 and 4 farms were the largest, but the paying acreage in these farms averaged less than that for classes 1 and 2.

Net farm income per farm generally increased as the paying acreage increased (table 17). This was the case even though the size of farm did not consistently increase with the increase in paying acreage. Net farm incomes of full-owners and part-owners were nearly equal and averaged about \$4,400 (table 18). Net farm income of tenants averaged about one-third less.

Livestock accounted for 41 percent of the gross cash income and crops for 57 percent. These percentages varied little whether they were for full-owners, part-owners, or tenants. Livestock was the source of 40 to 46 percent of the gross farm income of operators on farms in classes 1, 2 and 3, but it accounted for only 17 percent for class 4 farms.

NET WORTH OF OPERATORS

Belle Fourche

Average net worth of farmers on the Belle Fourche in 1946 was \$12,385, based on the present inflated prices of land, livestock, and equipment. Farmers who operated over 800 acres had by far the largest net worth and also the greatest annual gain in net worth. In fact, the annual gain in net worth was small for all groups under 600 acres. If net worth had not

14/ Lower Yellowstone.

Correlation of net farm income and total acres in farm	-r=+.19
Correlation of net farm income and paying acreage	-r=+.38
Correlation of net farm income and irrigated acreage	-r=+.41
Correlation of net farm income and livestock pastured out	-r=+.16
Correlation of net farm income and gross income from beets	-r=+.48
Correlation of irrigated acreage and gross income from beets	-r=+.60

been calculated at present high prices, farmers in the smaller size groups would have shown little if any annual gain. Generally speaking, farmers with the higher net worth also had the longer tenure.

Operators on class 2 and 3 land had the highest net worth but these groups also operated the larger farms and occupied their farms longer. On the smaller farms, the average annual gain in net worth of operators on class 1 farms was nearly as large as those on class 2 and 3 farms, and larger than for class 4 farms. The longer tenure of operators on class 2 and 3 farms took them through the two depressions after World War I when heavy losses frequently occurred. Many operators who started to farm in the last 10 years have been able to show a high annual gain in net worth.

Full-owners owned land and buildings valued at slightly over \$12,000 per farm. The valuation for part-owners was slightly under \$11,000. No attempt was made to get a normal value. Part-owners had livestock valued over \$6,000, whereas the livestock of full-owners and tenants was valued at about \$2,000. Liabilities of each tenure group were about offset by the cash and bonds on hand with the exception of full-owners whose liabilities were somewhat larger than their liquid assets.

Lower Yellowstone

Average net worth of farmers on the Lower Yellowstone in 1946 averaged \$21,836. Those on the larger farms had the larger net worth although these farmers also had been on their farms longer than had the others. The average annual gain in net worth averaged from \$1,057 to \$1,497 regardless of size groups, with two exceptions. Those under 100 acres averaged \$677 and those from 300 to 399 acres, \$2,126.

Farmers on class 1 farms had a higher net worth, due chiefly to larger paying acreages. The annual gain in net worth for farmers on class 1 land averaged \$1,648 compared with a little over \$1,100 for each of the other three classes. Farmers who had larger acreages of paying land had higher net worth and higher annual gain. The net worth of full-owners averaged \$29,360; part-owners, \$19,643; and tenants, \$5,452. Full- and part-owners had been on their farms more than twice as long as had tenants. These farmers were also in an older age group.

OTHER RELATIONSHIPS BETWEEN IRRIGATED AND DRY-LAND AGRICULTURE

As already stated, one-third of the farmers on each project operated some land off the project. The land operated off the Belle Fourche project was used chiefly for range and pasture while one-fourth of the land outside the Lower Yellowstone farms was dry-farmed. The land off the Belle Fourche project is primarily grazing land which is not suitable for farming. In the past, a high percentage of the land has been county-owned.

Farmers on the Belle Fourche project pastured out three times as many livestock per farm as did those on the Lower Yellowstone. Agriculture on the Belle Fourche was less intensive than that on the Lower Yellowstone.

Over 11 percent of the farmers on both projects bought hay from dry-land operators and about the same percentage bought grain. Very few irrigators sold hay or grain to dry-land operators during 1945.

Feeding cattle and lambs was a big business on both projects. Nearly one-third of the operators on the Lower Yellowstone bought feeder lambs. More than half of these were purchased over 100 miles from the project. A few bought lambs up to 500 miles from the project. Nearly one-third of the operators bought feeder cattle. These were usually purchased locally. Not many operators bought both feeder cattle and feeder lambs; it was usually one or the other.

Nearly one-third of the operators on the Belle Fourche project bought feeder lambs. These lambs were nearly all purchased within 75 miles of the project. This is somewhat in contrast to the Lower Yellowstone. Relatively few operators on the Belle Fourche project bought feeder cattle off the project and those purchased were bought locally.

It is evident that the irrigation farmers make considerable use of surrounding resources. A high percentage own or lease land outside the project and pasture out livestock. A few buy hay and grain from dry-landers. Feeding is practiced extensively on both projects. The following illustrates some of the differences in the organization of irrigated farms.

	Farm No. 1	Farm No. 2
Class of farm	3	2
Irrigated acres	90	115
Paying acres	100	115
Land in project	300	190
Land off project	1,000	0
Total acres in farm	1,300	190
Livestock pastured out (A. U.)	340	0
Gross farm income	5,200	4,600
Total expenses	3,500	2,000
Net farm income	1,700	2,600

OTHER FACTORS AFFECTING FINANCIAL PROGRESS

Nearly all the farmers on the Belle Fourche and Lower Yellowstone used barnyard manure as fertilizer. Nearly all the farmers on the Lower Yellowstone used commercial fertilizer compared with less than half on the Belle Fourche. The two projects differed somewhat less in use of green manure and pasturing of beet tops as fertilizer practices, but these practices as well were more prevalent on the Lower Yellowstone. A higher percentage of the farmers on the Lower Yellowstone followed definite crop rotations than on the Belle Fourche.

A lower percentage of tenants on both projects followed crop rotations than the two tenure groups, although on the Belle Fourche a higher percentage of tenants than full- or part-owners used commercial fertilizer and pastured beet tops. The tenure groups on the Lower Yellowstone differed little on the basis of fertilizer used.

Share rent was the more common type of lease on both projects, although a considerable number of leases were share and cash. Relatively few cash leases were in operation. Share rent was usually one-half for hay, one-third for grain, and one-fifth for beets. Relatively few exceptions to these rates were found on either project.

Landlords who lived within 50 miles of the project outnumbered about three to one on the Lower Yellowstone those who lived a greater distance away. On the Belle Fourche, landlords who lived within 50 miles of the project about equalled in number those who lived a greater distance from it.

An average of 10 acres per farm was reported leveled on the Belle Fourche and farmers estimated that an additional 31 acres needed leveling. An average of 29 acres was reported drained and an additional 11 acres needed drainage. The amount of leveling done on the Lower Yellowstone was about the same as on the Belle Fourche, but the amount that remained to be leveled, in the opinion of farmers, was much less.

On the Belle Fourche project, the labor of the operator and his family averaged 17 man-months. In addition, labor hired, exclusive of beet labor, averaged 5 man-months. On the Lower Yellowstone, family labor averaged 15 man-months and hired labor, exclusive of beet labor, 6 man-months.

Approximately 15 percent of the operators on the Belle Fourche project did nonfarm work, and these averaged a little over 2 man-months. A few did from 3 to 8 man-months of nonfarm work. About 15 percent of the operators on the Belle Fourche did nonfarm work and these averaged a little less than 3 man-months. Considering all operators, an average of 1 to 2 weeks is devoted to nonfarm work, but those operators who do nonfarm work often devote many months to these other jobs.

On the Belle Fourche project, about one-fourth of the operators did custom work or other farm work off their own farms, and this averaged about 10 days. On the Lower Yellowstone, only 17 percent did farm work off the farm and this averaged 15 days. Considering all operators on the project, the amount of farm work off the project would average only 2 to 3 days per operator.

SELECTION OF SAMPLE

In sample selection, the farms of those irrigating on the projects were stratified by class of irrigable land and paying acreage per farm.^{15/} A sample was then drawn at random of 73 farms from the Belle Fourche and 92 farms from the Lower Yellowstone.

The sample includes 19 percent of the farms which contained irrigable land on the Belle Fourche and 20 percent on the Lower Yellowstone. It includes from 16 to 21 percent of the land on each class of farm on both projects (table 1). ^{16/} The average paying acreage per farm in the Belle Fourche sample was 8 percent larger than the average for the project and was within 15 percent of the average for each class of farm except class 4. Paying acreage per farm on class 4 farms in the sample was about twice as large as the average of all class 4 farms. The average paying acreage per farm in the Lower Yellowstone sample was 8 percent larger than the average for the project. On class 4 farms, however, the paying acreage per farm in the sample was over one-half larger than the average of all class 4 farms.

TABLES

TABLE 1.--REPRESENTATIVENESS OF SAMPLES

Class of farm	Farms in sample as percentage of farms on project		Paying acreage per farm in sample as percentage of paying acreage per farm on project	
	Belle Fourche	Lower Yellowstone	Belle Fourche	Lower Yellowstone
	Percent	Percent	Percent	Percent
1	19	21	85	109
2	19	21	108	100
3	21	18	102	104
4	16	21	199	157
Average	19	20	108	108

^{15/} Paying acreage is land against which water charges are levied.

^{16/} Farms classified according to predominant class of irrigable land in each tract constituting the farm. Many farms contained land outside the project but were nevertheless classified according to predominant class of irrigable land as determined by the Bureau of Reclamation. There were no class 5 farms in the sample.

TABLE 2.- AVERAGE YIELD OF CROPS 1/

Crop	Unit	Belle Fourche	Lower Yellowstone
Barley	Bu.	25	29
Oats	Bu.	32	39
Wheat	Bu.	17	21
Sugar beets	T.	10	12

1/ See footnotes 2 and 3, page 2 for source.

TABLE 3.- AVERAGE SIZE OF FARM

Item	Belle Fourche		Lower Yellowstone	
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
Average size of farm	740	100	344	100
Project land	278	37	157	46
Paying	136	18	105	30
Nonpaying	142	19	52	16
Off-project land	462	63	187	54

TABLE 4.- DISTRIBUTION OF SIZE OF FARM

Acres in farm <u>1/</u>	Number of farms			
	Belle		Lower	
	Fourche		Yellowstone	
	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Under 201 acres	29	39	49	54
201-400	27	37	24	26
401-600	5	6	7	8
601-800	3	4	3	3
801-1600	5	6	5	6
1601-4000	4	4	3	3
4001 and over	3	4	0	0
Total	73	100	91	100

1/ Includes land off the project.

TABLE 5.- LAND USE PER FARM

Land Use	Belle		Lower	
	Fourche		Yellowstone	
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
<u>Project land</u>				
Irrigated	88	12	107	31
Dry-farmed	41	5	4	1
Pasture	149	20	46	14
Total project land	<u>273</u>	<u>37</u>	<u>157</u>	<u>46</u>
<u>Off-project land</u>				
Irrigated	2	-	2	-
Dry-farmed	19	3	46	13
Range and pasture	<u>441</u>	<u>60</u>	<u>139</u>	<u>41</u>
Total off-project land	<u>462</u>	<u>63</u>	<u>187</u>	<u>54</u>
Total all land	740	100	344	100

TABLE 6.- PAYING ACREAGE PER FARM

Paying acres	Number of farms			
	Belle Fourche		Lower Yellowstone	
	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Under 41 acres	7	10	14	15
41 - 80	14	19	24	26
81 - 120	19	26	25	27
121 - 160	17	23	17	19
Over 160	<u>16</u>	<u>22</u>	<u>12</u>	<u>13</u>
Total	73	100	92	100

TABLE 7.- IRRIGATED ACRES PER FARM IN 1945

Irrigated Acres	Number of farms			
	Belle Fourche		Lower Yellowstone	
	<u>No.</u>	<u>Percent</u>	<u>No.</u>	<u>Percent</u>
Under 41 acres	19	26	13	14
41 - 80	21	29	24	26
81 - 120	21	29	22	24
121 - 160	5	7	19	21
Over 160	<u>7</u>	<u>9</u>	<u>14</u>	<u>15</u>
Total	73	100	92	100

TABLE 8.- AVERAGE SIZE OF FARM BY CLASS OF FARM

Class of farm <u>1/</u>	Average acres in farm		Average livestock pastured out	
	Belle	Lower	Belle	Lower
	Fourche	Yellowstone	Fourche	Yellowstone
	<u>Acres</u>	<u>Acres</u>	<u>Animal units</u>	<u>Animal Units</u>
1	174	274	22	7
2	946	274	22	6
3	674	525	35	14
4	524	340	10	3
Average	740	330	25	8

1/ See Introduction for definition.

TABLE 9.- LAND TENURE

Tenure	Belle Fourche		Lower Yellowstone	
	<u>Acres</u>	<u>Percent</u>	<u>Acres</u>	<u>Percent</u>
<u>Project land</u>				
Owned	135	18	112	33
Leased	<u>143</u>	<u>19</u>	<u>45</u>	<u>13</u>
Total project land	<u>278</u>	<u>37</u>	<u>157</u>	<u>46</u>
 <u>Off-project land</u>				
Owned	132	18	115	33
Leased	<u>330</u>	<u>45</u>	<u>72</u>	<u>21</u>
Total off-project land	<u>462</u>	<u>63</u>	<u>187</u>	<u>54</u>
Total of all land	740	100	344	100

TABLE 10.- TENURE OF OPERATOR

Tenure of operator	Belle Fourche	Lower Yellowstone
	<u>Percent</u>	<u>Percent</u>
Full-owner	30	50
Part-owner	32	32
Tenant	<u>38</u>	<u>18</u>
Total	100	100

TABLE 11.- NET INCOME AND NET WORTH, BY SIZE OF FARM,
BELLE FOURCHE IRRIGATION PROJECT

Size	No. of farms	: Paying acres	: Livestock: pastured out 1945	: Years opr. on farm	: Net income 1945 ^{1/}	: Net Worth 1946	: Annual gain in net worth
	<u>No.</u>	<u>Acres</u>	<u>A.U.</u>	<u>Years</u>	<u>Dollars</u>	<u>Dollars</u>	<u>Dollars</u>
Under 201 acres	29	89	12	11	1,743	7,294	425
201 - 400	27	144	27	18	1,998	10,768	421
401 - 600	5	118	18	6	2,002	4,206	213
601 - 800	3	200	0	6	2,871	8,884	709
801 - 1600	5	176	60	18	6,589	24,718	980
1601 - 4000	4	312	25	18	9,487	28,919	1,338
4001 and over	3	140	89	20	5,344	45,600	2,343
Average		136	25	14	2,806	12,385	647

^{1/} Adjusted for changes in value of inventories between beginning and end of year, but no deduction for depreciation on buildings and machinery.

TABLE 12.- NET INCOME AND NET WORTH, BY CLASS OF FARM,
BELLE FOURCHE IRRIGATION PROJECT

Class	No. of farms	No. of farms	Size of paying acreage	Size of farm	Livestock pastured out	Years on farm	Tenants	Average age	Net income 1945 1/2	Net worth 1946	Annual gain in net worth
	No.	Ac.	Ac.	A. U.	Yrs.	Pct.	Yrs.	Dol.	Dol.	Dol.	
1	9	116	174	22	7	67	48	1,810	6,793	728	
2	37	155	946	22	15	38	45	3,519	15,533	786	
3	22	102	674	35	17	27	50	2,318	10,854	451	
4	5	181	524	10	9	40	48	1,468	5,899	522	
Average		136	740	25	14	38	47	2,806	12,385	647	

1/ See Introduction for definition.

2/ Adjusted for changes in value of inventories between beginning and end of year, but no deduction for depreciation on buildings and machinery.

TABLE 13.- NET INCOME AND NET WORTH, BY PAYING ACREAGE,
BELLE FOURCHE IRRIGATION PROJECT

Paying acreage	No. of farms	Size of farm	Size of farm	Livestock pastured out	Years on farm	Tenants	Average age	Net income 1945 1/2	Net worth 1946	Annual gain in net worth
Ac.	No.	Ac.	A. U.	Yrs.	Pct.	Yrs.	Dol.	Dol.	Dol.	
Under 41	7	1,212	46	17	14	57	3,411	12,153	513	
41 - 80	14	323	14	11	50	43	927	6,044	306	
81 - 120	19	378	28	18	37	50	2,256	10,008	350	
121 - 160	17	748	17	11	47	45	3,239	11,409	791	
161 & over	16	1,318	30	14	31	47	4,378	21,896	1,261	
Average		740	25	14	38	47	2,806	12,385	647	

1/ Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 14.- NET INCOME AND NET WORTH, BY TENURE OF OPERATOR
BELLE FOURCHE IRRIGATION PROJECT

Tenure of operator	No. of operators	Size of farm	Livestock : pastured : out	Years : on : farm	Ago of : operator : 1945	Not : income : 1946 1/	Not : worth	Annual gain : in : not worth
	<u>No.</u>	<u>Ac.</u>	<u>A. U.</u>	<u>Yrs.</u>	<u>Yrs.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>
Full-owner	22	306	19	19	52	2,395	15,633	535
Part-owner	23	1,725	41	20	51	4,364	20,211	886
Tenant	28	270	16	6	40	1,849	3,414	287
Average		740	25	14	47	2,806	12,385	647

1/Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 15.- NET INCOME AND NET WORTH, BY SIZE OF FARM,
LOWER YELLOWSTONE IRRIGATION PROJECT

Size	No. of farms	Paying : acres	Livestock : pastured : out 1945	Years : on : farm	Not : income : 1945 1/	Not : worth : 1946	Annual gain : in : not worth
	<u>No.</u>	<u>Ac.</u>	<u>A. U.</u>	<u>Yrs.</u>	<u>Dol.</u>	<u>Dol.</u>	<u>Dol.</u>
Under 100 ac.	16	46	4	13	1,814	9,810	677
100 - 199	32	107	4	13	3,871	21,811	1,300
200 - 299	14	117	9	12	3,299	17,671	1,057
300 - 399	10	147	1	15	8,829	34,763	2,126
400 - 499	6	156	8	14	5,225	24,984	1,497
500 - 1,099	11	109	16	19	4,405	28,946	1,317
1,100 & over	3	82	63	24	5,297	38,557	1,316
Average		105	8	14	4,164	21,836	1,289

1/Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 16.- NET INCOME AND NET WORTH, BY CLASS OF FARM,
LOWER YELLOWSTONE IRRIGATION PROJECT

Class of 1/ farm	No. of farms	Paying acreage	Size of farm	Livestock pastured out	Years on farm	Tenants	Average age	Net income 1945	Net worth 2/ 1946	Annual gain in not worth
	No.	Ac.	Ac.	A. U.	Yrs.	Pct.	Yrs.	Dol.	Dol.	Dol.
1	22	136	274	7	16	14	48	5,902	26,591	1,648
2	40	100	274	6	14	22	45	4,388	15,807	1,168
3	24	83	525	14	14	21	50	3,144	15,841	1,131
4	6	105	340	3	12	0	48	378	13,469	1,154
Average		105	344	8	14	18	48	4,164	21,836	1,289

1/ See Introduction for definition.

2/ Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 17.- NET INCOME AND NET WORTH, BY PAYING ACREAGE,
LOWER YELLOWSTONE IRRIGATION PROJECT

Paying acreage	No. of farms	Size of farm	Livestock pastured out	Years on farm	Tenants	Average age	Net income 1945	Net worth 1/ 1946	Annual gain in not worth
Ac.	No.	Ac.	A. U.	Yrs.	Pct.	Yrs.	Dol.	Dol.	Dol.
Under 41	14	169	2	9	21	52	1,500	9,619	584
41 - 80	24	467	6	16	12	50	2,469	16,127	881
81 - 120	25	359	12	15	24	44	5,239	22,854	1,287
121 - 160	17	220	4	11	23	46	4,528	27,244	1,920
161 & over	12	440	18	18	8	49	7,906	37,725	1,894
Average		344	8	14	18	48	4,164	21,836	1,289

1/ Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 18.- NET INCOME AND NET WORTH, BY TENURE OF OPERATOR,
LOWER YELLOWSTONE IRRIGATION PROJECT

Tenure of operator	No. of operators	Size of farm	Livestock pastured out	Years on farm	Age of operator	Net income 1945 ^{1/}	Net worth 1946	Annual gain in net worth
	No.	Acs	A. U.	Yrs.	Yrs.	Dol.	Dol.	Dol.
Full-owners	46	283	3	17	50	4,381	29,360	1,438
Part-owners	29	533	20	15	42	4,492	19,643	1,146
Tenants	17	185	2	7	37	3,018	5,452	535
Average		344	8	14	48	4,164	21,836	1,289

^{1/} Adjusted for changes in value of inventories between beginning and end of year but no deduction for depreciation on buildings and machinery.

TABLE 19.- AVERAGE FARM INCOME AND EXPENSES, BELLE FOURCHE AND
LOWER YELLOWSTONE IRRIGATION PROJECTS

Item	Belle Fourche	Lower Yellowstone
Number of farms	73	92
Sales:		
Livestock and livestock products	\$ 3,592	\$ 3,889
Crops	1,821	5,459
Off-farm employment	162	160
Total gross farm income	5,573	9,508
Operating expenses ^{1/}	2,769	5,344
Net farm income	2,807	4,164

^{1/} Adjusted for change in inventory.

